

# Interventions to Improve Chronic Illness Care: Evaluating Their Effectiveness

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## ABSTRACT

Three overlapping initiatives can be found in the effort to improve the management of chronic illness: the report card initiative, the disease management industry, and "Improving Chronic Illness Care." The third of these initiatives proposes the Chronic Care Model to assist provider organizations in chronic care improvement. The Chronic Care Model is made up of six major elements: community resources, the health care system surrounding the provider organization, patient self-management, decision support, delivery system redesign, and clinical information systems. Within these elements are a number of components, for example, clinical practice guidelines, reminder prompts, disease registries, provider feedback systems, primary care teams, planned chronic care visits, and case management. A literature review is provided to summarize the effectiveness of these Chronic Care Model components.

## INTRODUCTION

**M**ANAGEMENT OF CHRONIC ILLNESS in the United States is inadequate. Only 27% of patients with hypertension have blood pressures under control.<sup>1</sup> Forty-six percent of diabetics have glycosylated hemoglobin (HbA1c) levels below 7.<sup>2</sup> Only 14% of patients with coronary heart disease reach levels of low-density lipoprotein (LDL) cholesterol recommended by national standards.<sup>3</sup> Half of tobacco users are not counseled about smoking cessation by their clinicians.<sup>4</sup> Similarly distressing statistics can be found for patients with congestive heart failure,<sup>5</sup> chronic atrial fibrillation,<sup>6</sup> asthma,<sup>7</sup> and depression.<sup>8</sup>

## THREE INITIATIVES IN THE CHRONIC CARE LANDSCAPE

In the early 1990s, several efforts emerged in the United States to address the inadequacy of chronic care. These efforts came from diverse organizations including the U.S. Centers for Disease Control and Prevention, the National Committee for Quality Assurance (NCQA), a few integrated delivery systems, and some pharmaceutical companies. By the year 2000, the health care system was inhabited by three overlapping but distinct trends to improve chronic care: the report card initiative, the disease management (DM) industry, and the "Improving Chronic Illness Care" (ICIC) initiative.

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At the risk of offending numerous people and organizations, let us summarize the differences among these three initiatives.

#### *The report card initiative*

The initial theory behind performance report cards was that purchasers would reward, and patients would join, health plans and provider organizations with better scores on preventive and chronic care measures.<sup>9</sup> The best-known report cards are those offered by the NCQA's Health Plan Employer Data and Information Set® (HEDIS), but similar measures have been publicized by employer coalitions and state governments. The initial theory turned out to be wrong; most employers and patients do not use report card data to choose their health care providers. However, the data feedback from report cards may be having some impact on galvanizing providers to improve their care of chronic illness.<sup>10</sup>

#### *The DM industry*

During the mid-to-late 1990s, a DM industry—including pharmaceutical firms, pharmacy benefit managers, and for-profit startups—was born, offering chronic care programs as well as financial savings to insurers and providers of care. The mantra of the industry can be summed up as: “Better chronic illness care saves money. If our company can improve chronic illness care and save money for HMOs [health maintenance organizations], hospitals, or physician groups, these organizations will buy our disease management services.” By 1999, about 200 companies were offering DM programs for illnesses such as diabetes, asthma, and congestive heart failure. Some programs send educational materials to patients and physicians. Others offer patient education classes. Some provide telephonic nurse case management to patients whose illness is not controlled. The difficulty with the DM industry has been that its claims of improved care and reduced costs often lack well-designed trials.<sup>11</sup> While controlled trials of multi-intervention DM programs are difficult to perform, they are essential for demonstrating reliable scientific evidence.

By the year 2000, only a few DM firms ap-

peared to be prospering. Most DM companies had few clients and little revenue. Some commercial HMOs have begun their own DM efforts; these mainly consist of giving physicians clinical practice guidelines, sending patients educational materials and reminders, and informing physicians of the names of patients who have not complied with chronic illness management schedules.

While the NCQA's HEDIS program and the DM industry captured the headlines through numerous articles in health-related and popular publications, a quieter quest for chronic care improvement was percolating within some large health systems. This movement—ICIC—offers a comprehensive model for improving chronic care.

#### *ICIC*

The ICIC initiative began at a handful of non-profit integrated delivery systems, including Lovelace Health Systems in Albuquerque, NM; Harvard Community Health Plan (now Harvard Vanguard Medical Associates) in Boston, MA; Group Health Cooperative of Puget Sound in Seattle, WA; Henry Ford Health System in Detroit, MI; and Kaiser-Permanente. The effort was catalyzed by leaders within these systems, and also by national organizations concerned with improving chronic care, most notably the Institute for Healthcare Improvement and the Robert Wood Johnson Foundation.

The conceptual framework for ICIC was developed at the MacColl Institute for Healthcare Innovation at Group Health Cooperative of Puget Sound. Based on an examination of leading organizations' chronic illness programs, MacColl Director Edward Wagner developed the Chronic Care Model, to be used as a guide for provider organizations desiring to improve the care of chronic illness. The Chronic Care Model exemplifies a healthy relationship between theory and practice: Theory (the model) grows from practice (and from study of scientific evidence), feeds back to improve the practice, which in turn feeds back to modify and improve the theory.

Some DM advocates would question the separation of the DM industry and ICIC, arguing that the industry utilizes the Chronic Care

Model. Indeed, there is overlap. But major differences are evident. The industry's goal is cost reduction first and chronic care improvement second. If a company's program does not reduce costs, it cannot be marketed, and the company will fail. ICIC's primary goal is to improve the care of chronic illness. If a program works to improve chronic illness, it is considered valuable whether or not it reduces costs.

A second difference is that the DM industry's programs seldom take place within health care institutions, but are outsourced to a separate firm. As a result, the physicians caring for the program's clients have little involvement in the DM program and—if the program demands more work from them—are often hostile. In contrast, ICIC programs take place within a physician's institution and try (with mixed success) to gain physician buy-in. Outsourcing specific components of a provider-based chronic care program may be valuable, especially in small provider organizations.

Finally, ICIC programs use the Chronic Care Model as a guide to their activities, attempting to institute as many elements of the model as possible and understanding that chronic care improvement is a complex process that requires an entire system change. In contrast, the DM industry typically offers programs that are limited in scope.

Report cards and the DM industry have made contributions to the nation's effort to improve chronic care. The attempts of some provider organizations to initiate ICIC programs were stimulated in part by a desire to improve HEDIS scores. The DM industry has acted as a laboratory of ideas and methodologies for chronic care improvement, and the companies that survive may be able to supplement the efforts of provider organizations to improve the care of specific chronic conditions. As outlined below, the Chronic Care Model encompasses elements of both the report card and DM industry initiatives.

### THE CHRONIC CARE MODEL

The Chronic Care Model constitutes a major rethinking of primary care practice, identifying six essential factors in chronic care manage-

ment: community resources, health care organization, self-management support, decision support, delivery system redesign, and clinical information systems.<sup>12-16</sup>

*Community resources* involve linkages between provider organizations and programs such as senior centers, patient education classes, and home care agencies. *Health care organization* refers to the goals and policies of the provider organization and of the health care system impacting on that provider organization. For example, if provider leadership is not interested in improving chronic care, few advances will take place. If the mechanisms used to reimburse the provider organization do not reward better chronic care, it will be difficult to sustain improvements.

The other four components of the Chronic Care Model are intrinsic to the provider organization (Table 1). *Self-management support* includes patient education and training in problem-solving and goal-setting, and—because most management of chronic illness is under the direct control of the patient<sup>17</sup>—may be the most important component of the chronic care model. *Decision support* involves availability to all clinicians of the best evidence-based knowledge through clinical practice guidelines and physician education. *Delivery system redesign* refers to the understanding that the structure of medical practice must be altered, creating practice teams with a clear division of labor, separating the management of chronic conditions from acute care by using planned visits and case management of high-risk patients. *Clinical information systems* provide data to help

TABLE 1. THE CHRONIC CARE MODEL'S FOUR INTERNAL COMPONENTS

- Self-management support
- Decision support
  - Clinical practice guidelines
  - Clinician education
- Delivery system redesign
  - Planned visits (including group visits)
  - Case management
  - Primary care teams
- Clinical information systems
  - Registries
  - Clinician feedback
  - Reminders

manage chronic illness for both individuals and populations in three ways: (1) reminder systems that help primary care teams comply with practice guidelines; (2) feedback to physicians, showing how each is performing on such chronic illness measures as HbA1c and lipid levels; and (3) registries for planning individual patient care and conducting population-based care.

The Chronic Care Model strives for an informed, activated patient interacting with a prepared, proactive practice team, resulting in productive encounters and improved outcomes.<sup>15,16</sup>

### WHAT IS THE EVIDENCE SUPPORTING THE CHRONIC CARE MODEL?

A considerable body of research is accumulating to answer the question: Which Chronic Care Model components are effective in improving patient outcomes in chronic disease? This research is attempting to create a science of "evidence-based management." In order to review this research, the MEDLINE database and the Cochrane Library were searched for meta-analyses and reviews of the following subjects: self-management education, clinical practice guidelines, physician education, case management, health care teams, chronic disease registries, performance feedback, reminder systems, and DM. We will review some of this research here.

#### *Self-management education*

Self-management education has two components: (1) training in knowledge and technical skills related to a specific chronic condition and (2) training, not condition-specific, in problem-solving skills to assist in behavior change.<sup>18</sup> Some of the most important research on self-management relates to diabetes care. A comprehensive review of diabetes self-management found that the knowledge/technical skills aspect of self-management education improves patients' knowledge but does not impact clinical outcomes.<sup>19</sup> Adding the problem-solving skills component can improve glycemic control.<sup>20</sup>

Similarly for asthma, a Cochrane review showed that patient education alone does not improve outcomes of patients with asthma.<sup>21</sup> A second Cochrane review looked at interventions involving patient education and activation through asthma action plans plus regular practitioner review (a delivery system redesign) and found that most studies improved clinical outcomes.<sup>22</sup>

In a review of studies of self-management for patients with arthritis, two of eight studies providing patient education alone found improved clinical outcomes, whereas all 10 studies of patients learning problem-solving skills showed improvement in comparison with control groups.<sup>18</sup>

One study of patient self-management of chronic anticoagulation therapy demonstrated that patients taught to monitor and titrate their medication doses achieved similar anticoagulation control, and greater patient satisfaction, than patients followed in an anticoagulation clinic.<sup>23</sup>

Lorig et al<sup>24</sup> conducted an important randomized controlled trial of self-management education including problem-solving skills training for patients with a variety of chronic conditions meeting together in a group. Compared with controls, the patients receiving self-management training had improved quality of life scores, which were maintained 2 years after the groups took place.

In summary, while traditional patient education alone does not appear to improve clinical outcomes in chronic disease, patient education together with training in problem-solving skills can improve outcomes; adding other Chronic Care Model components such as planned chronic care visits (regular practitioner review) probably increases the effectiveness of self-management education.

#### *Decision support*

The two major components of decision support are clinical practice guidelines and physician education. Studies have shown that simply making clinical practice guidelines available to physicians does not change medical practice.<sup>25</sup> Moreover, a survey of guidelines published by the U.S. Agency for Healthcare Re-

search and Quality found that more than three-quarters of guidelines were not up to date.<sup>26</sup>

A review of 99 studies by Davis et al<sup>27</sup> found that some forms of physician education can improve physician performance and (less frequently) clinical outcomes. Formal continuing medical education conferences were not effective, while academic detailing (outreach visits by physician educators) and the influence of local opinion leaders were usually successful. Combining several educational interventions produced a greater proportion of positive changes in health outcomes than using a single intervention.

Several Cochrane reviews examined the impact of different forms of physician education on professional practice and patient outcomes. Interactive educational workshops for physicians improved medical practice, while didactic presentations had almost no effect.<sup>28</sup> Face-to-face physician education (academic detailing) improved medical practice in all of 13 studies reviewed.<sup>29</sup> Six of seven trials found that the influence of local opinion leaders enhanced practice, but in only one of three trials did patient outcomes improve.<sup>30</sup> Producing printed educational materials for physicians had virtually no impact on professional performance.<sup>31</sup>

Do particular decision support practices work better for some chronic conditions than for others? This question cannot yet be answered since the reviews cited combine studies on a variety of clinical problems.

### *Delivery system redesign*

Delivery system redesign can involve a number of interventions; three of the most common are the planned chronic care visits, case management, and formation of primary care teams.

*Planned visits.* The purpose of planned chronic care visits is to combat the “tyranny of the urgent”<sup>11</sup> (ie, the phenomenon whereby acute problems tend to crowd out chronic care during the typical physician visit). Planned visits, which can be individual or in groups, may be held by physicians, nurses, pharmacists, or a team of caregivers.

A few studies demonstrate that planned vis-

its have a positive impact on clinical outcomes, especially in diabetes. In a controlled trial, planned group visits for diabetics significantly reduced HbA1c levels and hospital use for diabetics in the Kaiser-Permanente system.<sup>32</sup> At Group Health Cooperative, planned diabetes “mini-clinic” visits improved HbA1c levels for patients who actually attended the visits.<sup>33</sup> A Cochrane review of five trials combining planned follow-up visits with reminder systems (see below) found a lowering of HbA1c compared with controls.<sup>34</sup>

For more difficult patients, however, planned visits fall short. In a study of frail elderly patients, planned visits failed to show reduction in falls, improvement in depression scores, or better physical functioning compared with usual care.<sup>35</sup> For complex problems such as these, the intensive intervention of case management may be needed.

*Case management.* Case management refers to intensive proactive outreach by nurses to high-risk patients, often by telephone but at times through clinic visits or home visits, to check on symptoms, success of health behavior change, and use of medications. Case managers will intervene—by arranging urgent visits or changing medication regimens—if patients exhibit worsening of their condition.

A review of case management programs in primary care for patients with congestive heart failure, diabetes, and mixed co-morbidities found six out of six studies showing improved outcomes compared with controls.<sup>36</sup> Nurse telephonic case management of congestive heart failure patients discharged from the hospital was associated with increased quality of life and markedly reduced hospital readmissions compared with controls.<sup>37</sup> Telephonic case management of coronary heart disease patients yielded reduced smoking, lowered LDL-cholesterol, and increased use of exercise compared with controls.<sup>38</sup> Case management of people 75 years of age or older by nurse practitioners performing home visits resulted in less progression of functional disability and reduced permanent nursing home stays compared with controls.<sup>39</sup> In summary, case management appears to be a highly successful delivery system redesign, though it is an ex-

pensive one and generally reserved for patients at high risk. It is not known for which specific conditions case management is most effective.

*Primary care teams.* A patient care team is a group of diverse clinicians who participate in, and communicate with each other regularly about, the care of a defined group of patients. Team care frequently involves delegation by the physician of chronic care responsibilities to other team members.<sup>40</sup> While no systematic reviews of studies involving teams has been done, a few studies have found that the addition of team members (eg, nurses, social workers, or pharmacists) can improve outcomes in chronic conditions. In one study, chronically ill elders managed by a primary care physician, nurse, and social worker team had fewer hospital admissions, physician visits, and health care costs, and an increase in social activities, compared with a control group.<sup>41</sup> In a separate study, chronically ill elderly patients receiving care from a home-visit team had improved quality of life but no significant reduction in hospital use compared with controls.<sup>42</sup> A number of these interventions are inseparable from case management. The addition of health educators to the care team allows patient self-management training to take place, and the addition of nurses, pharmacists, or (in the case of asthma) respiratory therapists makes planned chronic care visits possible. Adding medical assistants allows the primary care team to use reminder systems in improving care. Thus teams are more of a substrate upon which other interventions can be catalyzed rather than an intervention in themselves. The creation of teams may be the fundamental primary care redesign that allows other components of the Chronic Care Model to succeed.

One factor that makes controlled trials of teams versus non-teams difficult is that many such studies involve the addition of another professional (eg, nurse or pharmacist) to the caregiver mix in the intervention arm of the study. Having extra personnel conveys a great advantage, and is thus not a fair comparison with the personnel-poor caregiver "non-team" for the control group. One study in progress (as yet unpublished) suggests that functioning teams with a collaborative culture yield better

chronic disease outcomes than similarly staffed teams without such a culture.

### *Clinical information systems*

*Registries.* Registries are lists of all patients with a particular chronic condition on an organization's or physician's panel, and include important clinical data regarding that condition. Take the example of diabetes. HbA1c, LDL-cholesterol, urine microalbumin, blood pressure, and eye and foot exams are entered and tracked. For the care of individuals, registries can feed reminder systems that prompt caregivers to order tests that are past due. As a population tool, registry data can be sorted to identify and contact patients with elevated HbA1c levels or those lacking up-to-date eye exams.

No isolated studies of the effect of registries appear in the literature. However, a Cochrane review of five diabetes trials finds that systems that identify patients at risk and prompt health systems to bring those patients into care demonstrate slightly reduced HbA1c levels compared with usual care.<sup>34</sup>

*Clinician feedback.* Data collected from registries or from chart audits can be fed back to physicians to inform them of their performance compared with their peers. Examples of measures fed back to physicians include the percentage of diabetics on the physician's panel with HbA1c levels below 8, or the percentage of persistent asthmatics using steroid inhalers. Physician-specific feedback is problematic because of the need to risk-adjust the data, and because the number of patients with a specific condition seen by an individual physician is often insufficient to allow for a statistically meaningful comparison.<sup>43</sup>

A Cochrane review found that physician feedback can improve practice, but the effect is small.<sup>44</sup> Another review of studies looking at physician feedback reports that only 10 out of 24 studies showed positive results.<sup>27</sup> These studies examine a variety of conditions, and it is not known for which conditions feedback is most effective.

Feedback of performance data may be more useful for clinical sites rather than for individ-

ual physicians. For example, delivery systems with different sites may feed back performance data on the entire site; it is not known whether this process is effective, but it may become increasingly important if pay-for-performance reimbursement systems flourish.

*Reminder prompts.* More effective than data feedback is the reminder system, which may involve placing a sheet of paper on the front of a chart reminding the care team that preventive or chronic care actions are needed, or may be done through “pop-ups” on an electronic medical record. Twenty-two of 26 studies on physician reminders for a variety of chronic and preventive services found improvement in physician performance.<sup>26</sup> However, the overuse of reminders in an information-overloaded environment can be counterproductive. In one small study, 63% of physicians ignored the reminders or forgot to respond to them.<sup>45</sup> Reminders may be most helpful when combined with delivery system redesign, with a non-physician member of the clinical team responsible for acting on reminder prompts.

#### *Multiple Chronic Care Model component interventions*

It appears that clinical outcomes improve more when several Chronic Care Model components are utilized together, particularly in diabetes.<sup>13,46</sup> One example of a multiple-component intervention is found in a Danish study of 970 diabetic patients cared for by 474 general practitioners, comparing usual care with decision support, reminders, planned visits, and self-management training. After 6 years, HbA1c, blood pressure, and lipids were significantly lower compared with controls.<sup>47</sup> A similar multicomponent intervention study at HealthPartners Medical Group in Minnesota found improved outcomes for HbA1c and LDL-cholesterol.<sup>48</sup> In a review of 39 studies of diabetes management interventions using a variety of Chronic Care Model components, 32 demonstrated improved clinical processes or outcomes. While it was impossible to determine which combination of interventions was most effective, it is interesting to note that 19 of 20 studies involving patient self-management

training as one component showed improved outcomes.<sup>14</sup>

Weingarten et al<sup>49</sup> published a useful review and meta-analysis of physician and patient education, physician feedback and reminders, and patient reminders, separating the studies into disease categories. However, for most of the chronic conditions listed, few studies are available, making it difficult to conclude whether particular Chronic Care Model components are especially effective for particular diseases.

## CONCLUSION

Over the past decade, three major initiatives—performance report cards, a variety of interventions proposed by the DM industry, and the ICIC initiative—have emerged to improve the care of chronic illness. The Chronic Care Model developed by ICIC encompasses all of these initiatives, offering a number of interrelated components to improve chronic care. Gradually, an “evidence-based management” literature is developing to guide healthcare leaders in deciding which Chronic Care Model components are most effective in improving chronic illness outcomes. However, evidence-based management is still in its infancy, with important questions remaining unanswered. Which provider organizations are most effective in improving care for which diseases? Of the Chronic Care Model components shown to be effective, which are most effective and cost-effective for which illnesses? Medical science knows how best to care for most common chronic conditions, yet patients with these conditions are often in poor control. Evidence-based management research is needed to demonstrate how to close the gap between what we know and what we do.

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